1. A sugar refiner packs sugar into bags with an average weight of 1kg. Unfortunately, the filling equipment tends to drift - it is known that the process standard deviation is 0.1. From a sample of 100 bags the sample mean was 1.03. Is the process mean still 1kg? Use a 0.05 level of significance.
2. The mean response time of a species of pigs to a stimulus is .8 seconds. Twenty eight pigs were given 2 oz of alcohol and then tested. If their average response time was 1.0 seconds with a standard deviation of .3 seconds, can we conclude that alcohol a*ff*ects the mean response time? Use the 5 percent level of significance.
3. The weights of salmon grown at a commercial hatchery are normally distributed with a standard deviation of 1.2 pounds. The hatchery claims that the mean weight of this year’s crop is at least 7.6 pounds. Suppose a random sample of 16 fish yielded an average weight of 7.2 pounds. Is this strong enough evidence to reject the hatchery’s claims at the
   1. 5 percent level of significance;
   2. 1 percent level of significance?
   3. What is the p-value?
4. Students at IIT Jodhpur took the CAT examination last year. 456 IIT Jodhpur students had an average score of 60 with a standard deviation of 5.6. The national average is 56.5. Test the claim of an administrator that IIT Jodhpur students scored significantly higher than the national average. Test at the 0.05 significance level.
5. Consider a test of *H*0 : µ ≤ 100 versus *H*1 : µ > 100. Suppose that a sample of size 20 has a sample mean of X *=* 105. Determine the p-value of this outcome if the population standard deviation is known to equal 5.
6. A car is advertised as having a gas mileage rating of at least 30 miles*/*gallon in highway driving. If the miles per gallon obtained in 10 independent experiments are

26, 24, 20, 25, 27, 25, 28, 30, 26, 33

Should you believe the advertisement? What assumptions are you making?

1. It is claimed that a certain type of bipolar transistor has a mean value of current gain that is at least 210. A sample of these transistors is tested. If the sample mean value of current gain is 200 with a sample standard deviation of 35, would the claim be rejected at the 5 percent level of significance if
   1. the sample size is 25?
   2. the sample size is 64?
2. A wine shopkeeper claim that the number of bottles of a particular whisky sold everyday follows normal distribution with mean 9. The number of bottles of a particular whisky sold by an o*ffl*icence one week is given below:

9, 10, 8, 12, 13, 10, 9.

Test at the 0.01 level of significance whether the shopkeeper’s claim is true or not.

1. Certain rockets are manufactured with a range of 2,500 meters. It is theorized that the range will be reduced after the rockets are in storage for some time. Six of these rockets are stored for a certain period of time and then tested. The ranges found in the tests are as follows:

2490, 2510, 2360, 2410, 2300, and 2440.

Does the range appear to be shorter after storage? Test at the % significance level.

1

2

Here, the variation in ranges is also of importance. New rockets have a standard deviation of range measurements equal to 20 kilometers. Does it appear that storage increases the variability of these ranges? Use α *=* 0.05.

1. A gun-like apparatus has recently been designed to replace needles in administering vaccines. The ap- paratus can be set to inject di*ff*erent amounts of the serum, but because of random fluctuations the actual amount injected is normally distributed with a mean equal to the setting and with an unknown variance σ2. It has been decided that the apparatus would be too dangerous to use if σ exceeds .10. If a random sample of 50 injections resulted in a sample standard deviation of .08, should use of the new apparatus be discontinued? Suppose the level of significance is α *=* .10. Comment on the appropriate choice of a significance level for this problem, as well as the appropriate choice of the null hypothesis.
2. Aptitude tests should produce scores with a large amount of variation so that an administrator can dis- tinguish between persons with low aptitude and persons with high aptitude. The standard test used by a certain industry has been producing scores with a standard deviation of 5 points. A new test is tried on

20 prospective employees and produces a sample standard deviation of 8 points. Are scores from the new test significantly more variable than scores from the standard? Use α *=* 0.05.

———– Best of Luck ———–